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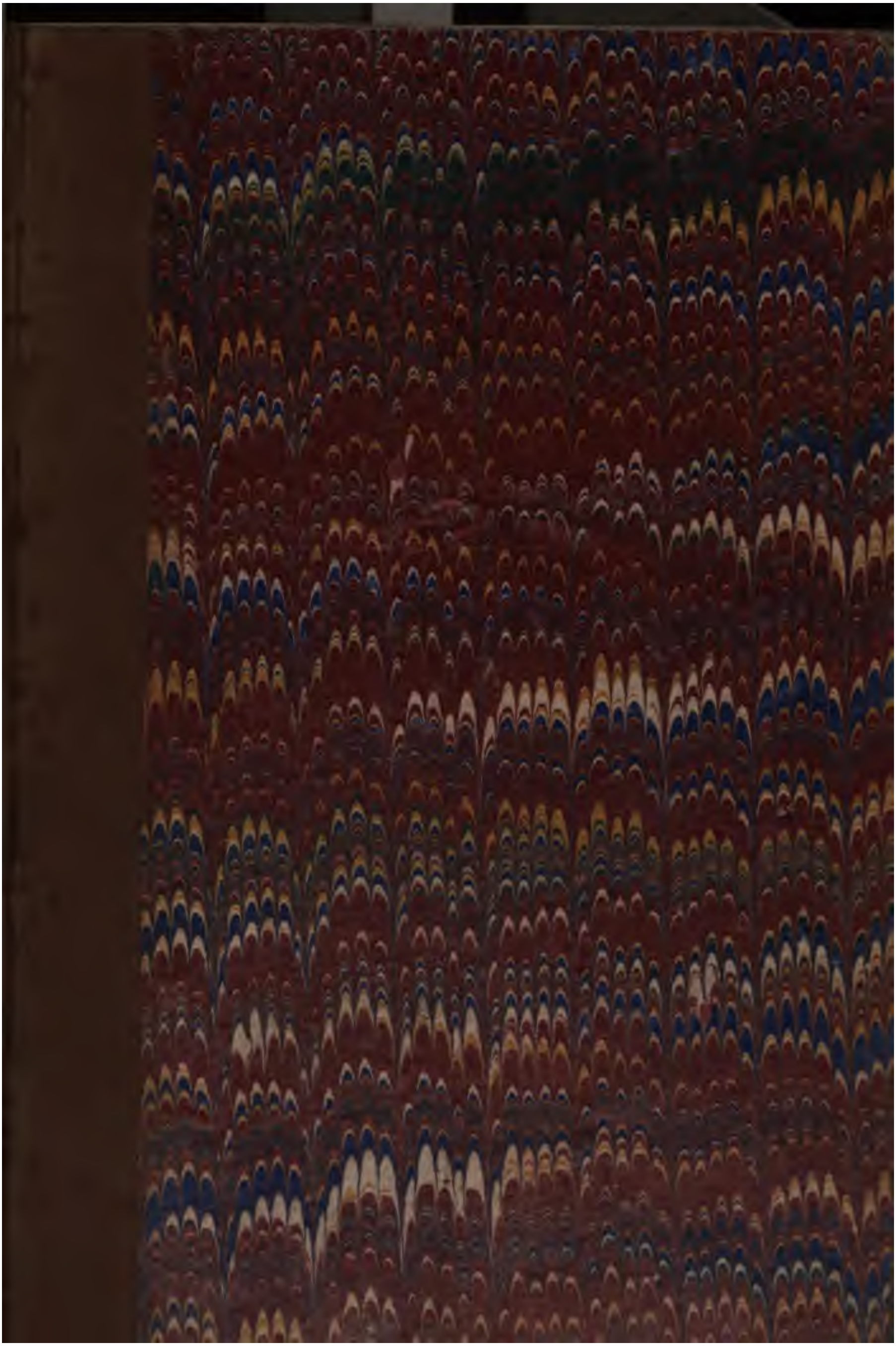

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ABRIDGMENTS

OF THE

Specifications

RELATING TO

DRAIN TILES AND PIPES.

PRINTED BY ORDER OF THE COMMISSIONERS OF PATENTS.

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17

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PREFACE.

The Indexes to Patents are now so numerous and costly as to be placed beyond the reach of a large number of inventors and others to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of Invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Subject-matter, Reference, and Alphabetical Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the latter are sold have been added.

Many Specifications being yet unpublished, the only guide in discriminating subjects in such cases has been the titles of Patents, which are frequently defective, and may therefore have led to an occasional omission.

When the entire series of Specifications shall have been printed it is intended to publish a new and complete edition of these Abridgments; meanwhile, the manifest usefulness of such works, and the urgency of the demand for copies, have been considered a sufficient justification for the present issue.

The present series comprises the inventions relating to drain tiles and pipes; and although many of them also embrace improvements in the manufacture of roofing and other tiles and bricks, they are only introduced because some portion refers to drain tiles and pipes. "Bricks and Tiles" will form a separate series, which will include all improvements in making bricks and roofing and flooring tiles. The apparatus and instruments used for cutting drains and for effecting drainage operations are likewise reserved for distinct publication.

B. WOODCROFT.

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DRAIN TILES AND PIPES.

A.D. 1619, January 12.—N° 11.

ETHERINGTON, John.—“ A sp̃iall priviledge graunted to “ John Etherington, shewing that whereas he hath found out the “ arte of making a certain engine to make and cast clay, all sort “ of earthern pipes for conveyance of water in the earth, and also “ monions and transomes for windowes, crests for houses, tyles, and “ paving stones, His Ma^{tie} doth hereby grant unto him sole power, “ for 21 yeares, to make and use the said engines for the purposes “ aforesaid—paying yearelie into His Ma$^{t's}$ Excheq^{r} xxvj^{s} viij^{d}.”

[No Specification enrolled.]

A.D. 1725, June 28.—N° 480.

EDWARDS, William.—No Specification or description of the invention protected by these Letters Patent was enrolled; but the following extract from the Letters Patent, as published in the Appendix to Reference Index of Patents of Invention, at page 70, will explain the nature of the invention :—“ George, by “ the Grace of God, &c. To all to whom these presents shall come, “ greeting: Whereas Our trusty and welbeloved William Edwardꝭ “ gentleman, hath by his petition humbly represented vnto Vs, That “ he hath after many yeares, much labour, pains, and great expence, “ found out and invented a new method never yet known or practised for making of pipes with clay or earth for the conveying of “ water vnder ground from place to place; that the said method is “ performed in manner following, viz^{t}: That the petitioner having “ provided a turned piece or plug of wood, according to the length “ of the pipe designed, and having fitted it on a potters wheel, “ with a ball of clay prepared for the purpose, and disposed to the “ bottom of the plug, which standꝭ vpright in the center of the “ potters wheel, the petic̃oner's servant by his directions (after “ having made several experimentꝭ of the said invention) turned “ vp with his handꝭ, on an engine contrived for the purpose, great “ quantities of pipes, with such expedition that one wheel could

“ turne off fifteen or twenty dozen of pipes in a day; that the clay
“ being prepared with a great deal of art, and ground in a mill by
“ an horse, the petic̃oner cann runn vp these pipes to the substance
“ of two inches, and to eight or ten or more inches diameter, if
“ required, in the bore; after they are dried to a fitting temper, they
“ are put vpon a turners lath, and are shaped with proper tools to
“ what form and fashion needfull, as spicket or other waies, so to
“ fit the boared end of the other pipe with a proper instrument that
“ they fit with all exactness, so as to admit of little or no wast of
“ water; but to make them more effectually do it, the petitioner
“ hath made and invented a cold putty, that cements and joynes
“ them them with that firmness that the cement becomes as hard
“ as any the burnt pipes, and as lasting in or out of water; that in
“ the laying these pipes in the earth (or out of it) the petitioner can
“ make them to rise or fall, and give them any the shortest turnings;
“ that besides the naturall strength of the clay, he can hoop them
“ with iron hoops or ring hoops made of the same clay as the pipes,
“ which will add double strength to them, and the petic̃oner beleives
“ will throw vp water to any height in reason; that the
“ petic̃oner hath made a pump of great depth of these pipes, which
“ draws its full quantity of water to the size of the bore, and works
“ with all ease and exactness; that his said invention is founded
“ vpon great experience in the proper preparing and working vp
“ the clay for this purpose, the same being wrought by the strength
“ of mens handſ, and turned vpon an engine contrived so admirably
“ that in the working of the clay the pipes shall be so firm
“ and strong that it becomes (after the proper drying) as solid as
“ any wood; and thus contrived, these pipes are turned with that
“ exactness (by an engine) that the one end is tapered so as to fit
“ the bore end of the other; that nothing can possibly be more
“ exact, and after the ioyning (the pipes are then so strong that no
“ strength can loose or part them, and will abide all weather and
“ water without perishing, they will be of singular vse in carrying
“ of water from the tops of houses and buildings; that by this new
“ invenc̃on it is apprehended that that it will be of generall vse
“ and advantage to Our kingdom, because that every county may
“ have such pipes made at their respective homes, and which will
“ be of great vse in employing the poor of this Our kingdom
“ through all the inland counties thereof.”

[Letters Patent enrolled in Rolls Chapel Office.]

A.D. 1766, March 25.—N° 843.

LINDSLEE, Thomas.—"The said composition for making fictile "pipes for the conducting of water, and other fictile wares, and "the method of making and burning the same, so as that the same "shall be as hard and durable as stone, are as follows (that is to "say):—Of pipe clay, mug clay, and flint stones calcined, all three "finely ground and sifted, equal quantities; Devonshire clay and "Staffordshire clay, finely ground and sifted, of each in the same "proportion to the mug clay as two is to five; of Stourbridge "clay, mug and stone ware, finely ground and sifted, white sand "and glass grinders sand, of each in the same proportion to the "mug clay as twenty is to twenty-five; of magnesia, finely ground "and sifted, in the same proportion to the white sand as five is to "twenty. The several materials aforesaid to be mixed with water "to a proper consistence, and after being kneaded with men's feet "or with any proper instrument, machine, or engine, to be formed "in tin or iron mouldings; and, when sufficiently dry, to be double "glazed with the following composition (that is to say):—Of "magnesia, red oaker, and yellow oaker, equal parts; of lead oar "half as much as magnesia; and of quarte in proportion to the "magnesia as one is to twenty. The same fictile pipes and other "wares are to be burnt, in cans made of the same materials as the "said pipes, in a kiln of a height proportionable to the length of "the said pipes and wares, and with four mouths."

[Specification Printed by Commissioners of Patents, price 3*d.* Notice in Rolls Chapel Reports, 6th Report, p. 159.]

A.D. 1802, December 21.—N° 2672.

SCOTT, John; CLARKSON, James; TATHAM, William; and MELLISH, Samuel.—Using "clumps" for the purpose of constructing water pipes, sewers, tunnels, wells, conduits, reservoirs, or other circular walls, shells, or buildings. These clumps are composed of earth, stone, clay, plaster, cements, compositions, kiln-burnt material, masonry, or any other suitable material. They are so formed "that the sides or edges thereof, when made and "compleated, shall join and fit to each other on an exact radius of "a circle, terminating of its centre; so that when all the said "parts are put together, with or without mortar or cement, the said "several clumps will form a direct circle, bearing pressure inwards

" on the principal of an arch; and that when the several layers, " courses, or distinct circles thereof shall be fitted and adjusted in " their proper places, such will form what is termed a broken joint " in the wall or shell, so that the same will alternately clamp or " join the courses next adjacent to them together, to prevent their " removal sideways,"—such clamping or interlocking being effected by a curved projection on one of the flat sides of each clump entering a corresponding recess in the side of the clump above or below the same.

[Printed, 7*d.* See Repertory of Arts, vol. 2 (*second series*), p. 333.]

A.D. 1803, May 10.—N° 2702.

BELL, ELIZABETH.—1. Relates to artificial methods of sweeping chimneys.

2. Forming chimney flues of certain blocks or masses of brick or pottery, or other cheap, durable, and incombustible materials, having a perforation of the dimensions of the intended flue. Building the chimney by placing the said blocks, bricks, or masses, upon or beside each other, so that the cavities therein shall form one flue. The said blocks or masses are fashioned with projecting fittings, which enter and close within each other; and the joining is made good with mortar, plaster, luting, or loam, or with metal or cramps.

[Printed, 4*d.* See Repertory of Arts, vol. 4 (*second series*), p. 174; and Rolls Chapel Reports, 6th Report, p. 201.]

A.D. 1807, March 7.—N° 3019.

BELL, ELIZABETH.—1. Relates to artificial methods of sweeping chimneys.

2. Making perforated blocks of such an external form as enables them to be placed in chimneys already built. To render these flues generally useful for the conveyance of water and other fluids, they are vitrified inside. The blocks are formed by means of moulds, which are filled with clay; and then an instrument is passed through the clay in the mould to form the opening in the block of the size and shape required: sometimes the perforation is made by a boring or piercing instrument; and a wire may be used for the same purpose. The clay is ground and mixed by putting it into an iron vessel or trough fitted with knives inside; and in this vessel a vertical spindle is made to revolve, having a series of knives fixed to

it, whereby the clay is cut. There is a shaft of iron passing through the lower part of the spindle, which moves round four or more iron rollers to break the clay by their gravity and motion. On leaving this vessel, the clay is made to pass through a series of double rollers, to break or keep back any stones that may be left in it. There is also a machine described for raising the prepared clay into carts.

[Printed, 6*d*. See Repertory of Arts, vol. 12 (*second series*), p. 89; and Rolls Chapel Reports, 7th Report, p. 198.]

A.D. 1808, January 26.—N° 3103.

STEWART, William.—Having worked or prepared the clay by knives, cutters, or arms, in a pug mill, the clay is allowed to pass through apertures in the floor of the mill, into a series of moulds for bricks or tiles; which moulds are united as an endless chain, and they operate in such a manner that as the filled moulds are depositing their contents upon boards, to be removed by workmen, other of the moulds are being again filled by their passage under the pug mill.

[Printed, 9*d*. See Rolls Chapel Reports, 7th Report, p. 199.]

A.D. 1808, April 30.—N° 3127.

BELL, William.—Making tubes of porcelain, pottery, and various compositions which are vitrifiable. These tubes are formed in such a way at the ends as to fit one within the other, and are connected or united together by cement so as to make them water-tight. They are enclosed in cast-iron pipes or cases to prevent their being broken or burst. Tubes may be made of compound metals or of wood variously prepared, and enclosed as above for particular purposes.

[Printed, 3*d*. See Repertory of Arts, vol. 14 (*second series*), p. 31; and Rolls Chapel Reports, 7th Report, p. 201.]

A.D. 1810, March 22.—N° 3319.

DEYERLEIN, Johann George.—This invention consists in a box or receptacle into which clay is put, and then upon the clay a plunger or forcing instrument is made to act; by means of which the said clay is forced outwards through suitable openings or orifices, which give the figure or form required to the expressed clay; such as that of bricks, flat tiles for flooring, edged tiles for roofing, or the products may be ornamental pipes, or cylindrical pipes, for conducting water,—suitable cores being fitted into the orifices for moulding such pipes.

[Printed, 10*d.* See Repertory of Arts, vol. 18 (*second series*), p. 259; and Rolls Chapel Reports, 7th Report, p. 208.]

A.D 1810, October 8.—N° 3391.

FRANCIS, Charles, and WATERS, William.—The invention consists in making grooves and hoops, fillets, or tongues at the ends of earthenware, composition, or potteryware pipes, for the purpose of joining the ends together with the addition of cement. Making pipes above five feet long.

Sometimes the joints are made to rest in a circular space, made in two half bricks. The patentees also connect these pipes to wood pipes.

[Printed, 6*d.* See Rolls Chapel Reports, 8th Report, p. 82.]

A.D. 1811, August 7.—N° 3473.

GILBERT, Thomas.—This invention consists in a revolving table, on which moulds for bricks, tiles, ornaments, pottery, and other articles are to be placed; and these moulds are filled with the composition from a stationary tub above the table. The moulded articles being on pallet boards are carried away by hand; and other pallet boards are put in the moulding frame during the operation.

[Printed, 8*d.* See Rolls Chapel Reports 7th Report, p. 112.]

A.D. 1813, February 20.—N° 3649.

HAMILTON, Joseph.—Making, fabricating, or constructing bricks, masses, or lumps of earthen building materials, for building walls, pavements, floors, arches, and other structures, with perforations through the same, which perforations correspond with similar ones in the pieces contiguous thereto; and also making pins, bars, bolts, or nails, of baked earth or other material, to be fixed in the said perforations, so as to unite the whole together, with or without the use of mortar, cement, putty, or other material.

Connecting the said earthen building materials by placing some vitrifiable substance between the parts, and fluxing the same, by making portions successively red hot by removable furnaces.

[Printed, 6*d.* See Repertory of Arts, vol. 26 (*second series*), p. 267; and Rolls Chapel Reports, 8th Report, p. 96.]

A.D. 1813, April 28.—N° 3685.

HAMILTON, Joseph.—" First, in order to lessen the incon-" venience which attends the withdrawing of the piston for the " purpose of charging the cylinder or DOD (used in the manu-" facture of earthenware, bricks, or tiles,) with clay or other fit " materials, and also to lessen the quantity of air which usually " accompanies the charge of clay or other fit materials into the said " dod or cylinder, [I] use a screw with a sufficiently deep thread, " in one or more pieces and of a convenient diameter; by the revo-" lutions of which screw in the cylinder or dod, on the principle of " the blue makers' screw, or the pump screw, I charge the cylinder " or dod at my convenience, and subject the clay or other fit mate-" rials to the necessary pressure with less inconvenience from air " than that which attends the use of a piston.

" Secondly, to enable several persons to work at or about one dod " or cylinder used for the said manufacture, I construct stopcocks ' or slides in any convenient number of tubes or pipes, through " which I force the clay or other fit materials with the said screw " from the cylinder or dod to the said several persons; by which " stopcocks or slides each of the said several persons can admit or " exclude the said clay or other fit materials, at such times as may " suit his or her convenience, without stopping the other person " or persons who may be working at or about the same dod or " cylinder at the same time."

[Printed, 3*d*. See Rolls Chapel Reports, 8th Report, p. 96.]

A.D. 1814, April 18.—N° 3803.

READ, John.—Preparing pliable clay or marle by working them with water to a complete puddle, which should be strained through a fine wire sieve into vats. When sufficiently dry, it must be worked by hand, or ground in a common clay mill.

To form pipes for raising and conveying water.—Sping them on a staff on a potter's wheel; form their ends with spigot and faucet joints, and others with flanch joints. When sufficiently dry, bore the inside to a true cylinder, and then burn them. Use Roman cement in forming the joints. The patentee forms the pipes of pumps in this manner, and glazes those of the lifting barrel inside. He unites the flanch joints with screws and metal collars; and secures the pipes to the side of the well. Steam, gas, or any other fluid may be conveyed in pipes prepared in manner before mentioned.

[Printed, 6*d*. See Mechanics' Magazine, vol. 2, p. 360; also vol. 3, p. 168.]

A. D. 1817, December 5.—N° 4183.

BUSK, William, and HARVEY, Robert.—These improvements in making pipes or tubes of porcelain, clay, or other ductile substances, consist in the use of a cylinder in which the clay is put, and in then forcing the clay by means of a piston through a moulding orifice, fitted with a core, so as to form a continuous pipe.

The apparatus may be placed on a carriage.

[Printed, 5*d*. See Repertory of Arts, vol. 33 (*second series*), p. 324; and Rolls Chapel Reports, 8th Report, p. 127.]

A.D. 1825, August 8.—N° 5232.

BAGSHAW, Samuel.— Forming pipes for the conveyance of water, gas, and other fluids, of a continued combination of two or more earthenware tubes of different diameters, the smaller being placed within the larger. They are made to break joint, and have a layer or layers of cement interposed between them.

[Printed, 5*d*. See Repertory of Arts, vol. 3 (*third series*), p. 42; London Journal (*Newton's*), vol. 11, p. 185; Register of Arts and Sciences, vol. 3, p. 346; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 303.]

A.D. 1830, August 18.—N° 5985.

BAKEWELL, Samuel Roscoe, (*partly a communication*).—1. Machines for mixing, grinding, and tempering clay or other plastic substances by the action of a wheel or wheels, travelling in a spiral course on the floor of a circular pit, so as to prepare the clay for making bricks, tiles, cornices, copings, &c. These machines may also be used for grinding, mixing, and tempering sand, lime, chalk, barilla, &c.

2. Machines for forming or pressing bricks, tiles, &c., in a single mould, the bottom whereof consists of a piston, worked up and down by a lever or toothed gearing, and the upper plate or top is carried by a swinging frame, or hinged to the top of the mould, or made to slide in dovetail grooves in the top of the

mould. Also a spring-catch brick mould for moulding bricks by hand.

[Printed, 2*s.* 4*d.* See London Journal (*Newton's*), vol. 8 (*second series*), p. 113; Mechanics' Magazine, vol. 15, p. 170; Register of Arts and Sciences, vol. 6 (*new series*), p. 43; Engineers and Architects' Journal, vol. 3, p. 160; and Rolls Chapel Reports, 7th Report, p. 133.]

A.D. 1830. . . . . . . N° 5985*.

Disclaimer to the specification of Letters Patent, No. 5985, filed in the Great Seal Patent Office, 15th August, 1840.

[Printed, 5*d.* See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 479.]

A.D. 1832, April 13.—N° 6257.

CLARK, JOHN JAMES; NASH, JOHN; and LONGBOTTOM, JOHN.—Machinery and implements for making pan-tiles, flat tiles, drain tiles, sole tiles, flooring tiles, bricks, quarries, water pipes, and other tubes, coverings for buildings, &c., also for making loaves and biscuits.

1. Forcing the clay from a pug mill through a hopper into two sets of detached or moveable moulds, carried by two pairs of wheels fitted with pistons to eject the filled moulds. The moulds are covered or lined with fibrous elastic substances or fabrics, capable of alternately absorbing and giving out air and moisture. Water or other liquid is applied in a novel manner to the moulds, pistons, and accessory working parts. Heaters are applied to the moulds.

2. Making flat tiles, flooring tiles, or coverings for buildings, by forcing the clay from a pug mill through a funnel-shaped hopper, the mouth whereof is made of a shape corresponding to the transverse section of the tile, and it is turned to one side so as to deliver the shaped clay on to an endless band.

3. Forcing the clay from a pug mill through a funnel-shaped hopper fitted with a core, so that it will be caused to emerge therefrom in the form of a pipe.

[Printed, 1*s.* 4*d.* See London Journal (*Newton's*), vol. 6 (*conjoined series*), p. 13; Mechanics' Magazine, vol. 23, p. 177; and Engineers and Mechanics' Encyclopædia, vol. 1, p. 259.]

A.D. 1833, May 25.—N° 6426.

BEART, ROBERT.—Manufacturing drain and other tiles by the use of moulds, capable of containing sufficient clay for a number of tiles, and provided with a false bottom, beneath which a piston is caused to act when required, and thus force above the upper edge of the mould a proper quantity for forming one tile. This portion is cut off level with the upper edge of the mould by means of an instrument furnished with a stretched wire; and then a further quantity of clay is forced up. The tiles thus produced, when intended for drain tiles, will only require to be bent over a proper shape or mould whilst moist. In place of the mould remaining stationary whilst the clay is forced up by the piston, the latter may remain stationary, and the mould be caused to descend.

[Printed, 6*d*. See Repertory of Arts, vol. 1 (*new series*), p. 11; and London Journal (*Newton's*), vol. 4 (*conjoined series*), p. 86.]

A.D. 1836, December 9.—N° 7253.

TWEEDDALE, George Marquis of.—Forming drain tiles by passing the clay from the feeding hopper between two horizontal cylinders on to an endless web, which passes over a shaping cylinder, turned out in the middle to the form of a drain tile; after which the tile is completed by passing between a pair of inclined rollers and a second shaping cylinder, and is carried by two narrow endless bands beneath a cutting wire, and thence by an endless web to the drying shed.

Making flats or soles by passing the clay between the horizontal cylinders on to an endless band, by which it is carried to the cutting wires.

Flat roofing tiles of equal thickness throughout are made in like manner; but if required to be thin at the upper or nail end, or to have a flat knob or prominence on the end, the upper horizontal cylinder must be suitably shaped. A nail-hole is made in each tile by a punch attached to a lever. Instrument for placing flat tiles on the drying shelves instead of the common peal.

Bricks are produced by modifying the machinery used in manufacturing flat tiles.

House tiles are formed by a pair of moulds, the upper worked by a lever or crank, and the lower capable of sliding on a rod out of its frame to deliver the tile.

The clay is prepared by passing between a pair of large crushing cylinders, and is then milled in the usual way.

[Printed, 1*s*. 2*d*. See Repertory of Arts, vol. 11 (*new series*), p. 193; and Mechanics' Magazine, vol. 31, p. 242.]

A.D. 1837, June 17.—N° 7391.

ROE, Richard.—Machine for pressing bricks, tiles, and other articles made from earthy materials, furnished with a mould, into which the article is introduced in a partially dry state, and then, by the ascent of a piston, it is pressed against the moveable cover of the mould.

[Printed, 1*s*. 1*d*. See Repertory of Arts, vol. 9 (*new series*), p. 269; and London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 164.]

A.D. 1838, August 1.—N° 7757.

TWEEDDALE, George Marquis of.—The invention forming the subject of these Letters Patent is the same as N° 7253. By the former Letters Patent the invention was protected in England, Wales, and the town of Berwick-upon-Tweed; and these Letters Patent were granted to extend the protection to the Colonies.

[Printed, 1*s*. 5*d*. See Engineers and Architects' Journal, vol. 6, p. 202.]

A.D. 1841, May 22.—N° 8965.

AINSLIE, John.—Machinery for making or moulding tiles, bricks, retorts, tubes, and other articles. The clay descends between a pair of feeding rollers (each furnished with a doctor or scraper beneath for guiding the clay) into a case containing a screw, by the revolution whereof the clay is forced into a chamber, and thence through moulds suitably formed to produce the articles required; and, on emerging therefrom, the moulded clay is received by a travelling endless web, which carries it beneath a cutting apparatus for dividing it into proper lengths. For making drain tiles, the roof of the chamber is formed on its internal side with diverging arches, each arch diverging to its corresponding mould, so that the clay, in its progress to the mould, receives an embryo shape, and is enabled to discharge itself in straight lines. Moulds for retorts must have cores suspended therein. When making house tiles, each mould must be formed with a sluice or stopper, by raising which a knob or button is left on the tile.

[Printed, 6*d*. See Repertory of Arts, vol. 4 (*enlarged series*), p. 75; Mechanics' Magazine, vol. 35, p. 286; Inventor's Advocate, vol. 5, p. 197; and Engineers and Architects' Journal, vol. 5, p. 427.]

A.D. 1841, December 7.—N° 9165.

IRVING, William. — Forming bricks and tiles by filling a large mould with clay, cutting off the surplus even with the top by a scraper, and then drawing a series of wires or narrow knives through the clay, which is thereby divided into a number of bricks or flat tiles, according to the dimensions of the mould and the distance between the wires or knives. Flat tiles, so made, may be bent into the proper form for draining purposes.

[Printed, 1*s*. 6*d*. See Engineers and Architects' Journal, vol. 5, pp. 8 and 61.]

A.D. 1842, May 31.—N° 9371.

WATSON, Richard.—1. Making perforated tubes and tiles for draining purposes, with the holes or openings enlarging from the outside inwards, whereby the openings will be rendered less liable to become clogged, and the water will be voided into the tube more freely than when the holes are of the same size throughout, or larger externally than internally.

2. Draining embankments and cuttings of railways and other engineering works, by applying perforated tubes from the face of an embankment, or of an open or other cutting.

3. Apparatus for boring holes in brickwork or masonry for draining cuttings and embankments of railways and other engineering works which are faced or lined with brickwork or masonry.

[Printed, 1*s*. 11*d*. See Mechanics' Magazine, vol. 41, p. 336; Record of Patent Inventions, vol. 1, p. 331; and Engineers and Architects' Journal, vol. 7, pp. 49 and 66.]

A.D. 1842, December 3.—N° 9534.

SEALY, John.—An improvement in the manufacture of tiles. The clay is prepared and the tile formed and deposited in the tile house to dry as usual; and when about two-thirds dry, it is placed on a dressing table or horse, the upper surface whereof is formed according to the shape of the tile to be made, and a roller of a corresponding form is passed to and fro across the surface of the clay, in order to finish the tile. New forms of tiles made with one, two, or more channels, and with one arched and one upright ledge, the former being intended to cover the latter as the tiles lie on the roof.

[Printed, 5*d*. See Repertory of Arts, vol. 1 (*enlarged series*), p. 163; London Journal (*Newton's*), vol. 23 (*conjoined series*), pp. 263 and 468; and Mechanics' Magazine, vol. 38, p. 299.]

A.D. 1842, December 3.—N° 9538.

ETHEREDGE, Frederick William.—1. Improvements in pug mills or such like machines, suitable for forcing clay or brick earth through orifices, in order to make two or more tiles simultaneously at one orifice, by causing the clay to pass over a mandril or core fitted with knives, which nearly cut through or divide the tubular-moulded mass of clay into two or more parts, so that such parts can be readily separated when dry.

2. Forming the bottom of a pug mill or other suitable expressing machine with several moulding orifices, each capable of making one or more tiles, combined with suitable apparatus for cutting off the tiles as they are forced through the orifices.

3. Mode of applying apparatus for receiving tiles as they are forced down through orifices in the bottom of a pug mill or other suitable expressing machine, and thus facilitating the removal of the tiles as they are formed and cut off.

The title of these Letters Patent originally read thus: "Improvements in the manufacture of bricks, tiles, and other similar plastic substances;" but by a Disclaimer and Memorandum of Alteration, filed in the Great Seal Patent Office, 5th June, 1843, the title was altered to "Improvements in the manufacture of tiles."

[Printed, 2*s*. See Repertory of Arts, vol. 2 (*enlarged series*), p. 65.]

A.D. 1844, March 30.—N° 10,132.

CLAYTON, Henry.—Relates to the manufacture of tiles, drain pipes or tubes, and bricks.

1. Machine for preparing and clearing the clay from stones, roots, or other extraneous and injurious matter.

2. Apparatus for expressing or forcing clay through orifices or dies, with or without a core, so as to form pipes or tubes and also tiles of various shapes.

3. Mode of lubricating certain parts of tile and brick-making machines.

4. Machinery for moulding or pressing clay in moulds in order to form bricks or tiles.

5. Use of a gauging board and cutter for reducing to a uniform length the various pipes or tiles which are to be burnt within each other.

6. Employment of quick lime to prevent the adhesion of the clay to the utensils, or of the newly-made tiles or bricks to each other.

[Printed, 7½*d*. See Mechanics' Magazine, vol. 41, p. 395.]

A.D. 1844, April 18.—N° 10,147.

DENTON, John Bailey.—Relates to machinery for moulding or shaping clay and other plastic substances into drain tiles, pipes, bricks, &c.; and consists in a mode of combining the use of two screws, which simultaneously act to press the clay or other plastic matter, either directly through suitable moulding orifices or into a chamber or chambers, from which it is forced through suitable orifices by other apparatus.

[Printed, 6*d*. See Repertory of Arts, vol. 5 (*enlarged series*), p. 95; London Journal (*Newton's*), vol. 25, (*conjoined series*), p. 393; and Engineers and Architects' Journal, vol. 8, p. 89.]

A.D. 1844, May 23.—N° 10,200.

WILSON, Richard.—Machine for making all kinds of tiles by means of pressure in moulds, placed upon the periphery or edge of a wheel having many sides. The wheel is, by preference, made in the form of a hexagon; and upon each of its six flat sides or edges an under mould is fixed. The wheel revolves on a horizontal axis beneath the upper mould, which descends, as each under mould arrives beneath it, and compresses the sheet of prepared clay previously placed in the under mould.

[Printed, 1*s*. 1*d*. See Repertory of Arts, vol. 5 (*enlarged series*), p. 233.]

A.D. 1844, July 30.—N° 10,276.

FORD, William.—1. Improvements in machinery for manufacturing tubes and drain tiles by forcing the clay through suitable moulding orifices by the action of a piston working in a chamber into which the clay is introduced.

2. Box or hand mould and mandril for making sockets or tubes and drain tiles.

[Printed, 11*d*. See Repertory of Arts, vol. 5 (*enlarged series*), p. 368; Mechanics' Magazine, vol. 42, p. 439; and Engineers and Architects' Journal, vol. 8, p. 119.]

A.D. 1844, August 29.—N° 10,299.

SMITH, James, and JOLLY, William Gairdner.—Relates to the manufacture of drain tiles and tubes.

1. Forming drain tiles with indented or jagged ends, so that they will interlock and support each other, and be prevented from getting out of one continuous line.

2. Mode of forming and delivering sheets of suitable material on to the horse, core, or other instrument, in aid of the workman when making tiles by hand. Forming tubes in a segmental mould. Using an oval horse or core.

3. Giving to machinery for making drain tiles a locomotive progression by the act of working the same, so that the workman standing by the machine may deliver the tiles as they are made on to shelves, racks, or surfaces, to dry.

4. Mode of feeding that class of machinery where pistons or plungers are used for forcing suitable materials through moulding orifices.

5. Employment of moulding orifices for making tubular tiles for draining, one within the other. Also, depositing tubes or tiles in a position to be dried by the action of the machines used in making the same.

6. Manufacturing tiles for draining by pressing peat into suitable forms in or upon moulds or through moulding orifices.

[Printed, 2*s*. 11*d*. See Repertory of Arts, vol. 6 (*enlarged series*), p. 1; and Engineers and Architects' Journal, vol. 8, p. 263.]

A.D. 1844, September 26.—N° 10,327.

CASSELL, EDWIN EDWARD.—Compounds or combinations of materials for paving, piping, roofing, &c.

For paving, flooring, or other like purposes, four varieties are used. To make No. 1, saturate chalk, marl, lime, loamy clay, or sandy earth, in fine powder, with oil of tar, mineral tar, vegetable naphtha, or any other resinous, oily, or fatty matter; mix 2 cwts. thereof with 1 cwt. of melted rosin in a cauldron; next add from 3lbs. to 6lbs. of liquid caoutchouc, or from 1lb. to 3lbs. of essential oil of tar or turpentine, or some other oily, fatty, or cementitious substance; and after this, introduce from 3lbs. to 5lbs. of sulphur, and finally, 2 cwts. of fine dry grit. In preparing No. 2, substitute vegetable pitch for rosin, and increase the amount of sulphur. No. 3, substitute equal parts of rosin and Stockton tar for the rosin or vegetable pitch, and reduce the quantity of sulphur. No. 4, differs from No. 3, in the substitution of equal parts of rosin and mineral or coal tar for the rosin and vegetable pitch.

Water-pipes, drains, sewers, &c., are made by casting any of the above compounds in a mould, upon a wooden ring or skeleton framework, or, in the case of small pipes, without such ring or framework.

The above compounds, and two other varieties thereof, are also applied to various other purposes.

[Printed, 11*d*. See Mechanics' Magazine, vol. 42, p. 329; and Engineers and Architects' Journal, vol. 8, p. 223.]

A.D. 1845, January 18.—N° 10,481.

AINSLIE, JOHN. — Improvements on the machinery which formed the subject of Letters Patent N° 8965. The clay, in instance, is conducted by a travelling endless web to a pair of rollers (each provided with a hinged scraper), which carry it into a chamber, and force it through a mould or moulding orifice in front of the same on to an endless web, whereby it is carried to the cutting apparatus. A screen (with a descending sluice or cleaner) may be placed in the middle of the chamber to separate stones or roots from the clay. When sandy clay or peat is to be moulded into tiles or bricks, rollers with "reefing slides" (moved in and out by a cam) must be substituted for the plain rollers.

Also, employing a piston for cutting off bricks (as they emerge from moulding orifices) by means of the pressure of compressed air.

[Printed, 1*s*. 6*d*. See Repertory of Arts, vol. 6 (*enlarged series*), p. 231.]

A.D. 1845, March 27.—N° 10,577.

WELLER, RICHARD.—Machinery for making drain and other tiles and pipes, consisting of two vessels for receiving the clay, mounted on trunnions at opposite ends of the framing, and successively acted upon by two pistons (fixed at opposite ends of a horizontal rack bar), for the purpose of expressing the clay through dies or moulding orifices at the outer ends of such vessels. Motion is communicated to the rack bar by means of a lever, and one piston is thereby caused to advance and express the clay from one cylinder, whilst the other cylinder, which has been caused to assume a vertical position, is being filled with clay, and so on alternately. In each piston there is an opening covered by a valve, which permits air to pass between the piston and the clay when the piston is drawn back. The tiles, as they are forced out, are received on suitable horses, and cut off by means of wires carried by a sliding frame; and when holes are to be punched in the tiles, a suitable punch is affixed to the sliding frame.

[Printed, 9*d.* See Repertory of Arts, vol. 7 (*enlarged series*), p. 53; and Engineers and Architects' Journal, vol. 3, p. 385, and vol. 9, p. 63.]

A.D. 1845, April 22.—N° 10,634.

ROE, Freeman.—Manufacturing pipes for conveying water and other fluids of glass, or of the vitreous materials of which glass is or may be made. Also modes of connecting glass pipes.

[Printed, 9*d.* See Repertory of Arts, vol. 7 (*enlarged series*), p. 46; Mechanics' Magazine, vol. 43, p. 321; and Engineers and Architects' Journal, vol. 8, p. 386.]

A.D. 1845, April 24.—N° 10,636.

BEART, Robert.—1. Brick for building purposes, made by forcing brick earth through a moulding orifice, having a series of cores to form holes in the brick.

2. Making holes or recesses in the ends of drain tiles or pipes, for the reception of wood or metal pegs, whereby the tiles or pipes may be connected together and retained at the same level.

3. Machine for moulding drain tiles, consisting of a horizontal trunk or chamber, into which the clay is introduced, and is then forced by a piston through moulding orifices in the end of the trunk. A grating is fixed across the trunk, near the moulding orifices, to intercept any stones which may be in the clay; and the piston is made hollow to receive such stones. The surface of the grating is kept free from stones by means of a knife or scraper, worked by a lever, and, by raising a plug, air is admitted into the space caused by the knife or scraper between the clay and the grating, so as to facilitate the return of the piston.

[Printed, 1*s.* 5*d.* See Repertory of Arts, vol. 7 (*enlarged series*), p. 14; and Mechanics' Magazine, vol. 59, p. 46.]

A.D. 1845, October 2.—N° 10,845.

HALL, Alfred.—Apparatus for making bricks, tiles, and other articles from earthy or plastic materials, by conducting the clay or other plastic material from a pug-mill into a chamber provided with a pressing plate, which turns on an axis at one edge and presses the clay through a grating (forming the bottom of the chamber) into a mould. The grating consists of a rectangular frame, with cross bars or divisions corresponding in number with the bricks or tiles to be produced at one working, or rather with the number of compartments in the moulds which are successively placed beneath it.

[Printed, 1*s*. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 153; and Engineers and Architects' Journal, vol. 9, p. 355.]

A.D. 1846, January 15.—N° 11,041.

BENSON, William.—Producing drain, ridge, and other tiles, pipes, and other articles, by a machine resembling the ordinary pug-mill, the vertical shaft whereof carries curved knives or arms, and is enlarged at the bottom into a conical form; at the lower part of the mill there are four dies or moulding orifices, situated at the four opposite sides of the same; and through these orifices the clay is forced by the curved knives (with the assistance of the cone) on to endless webs of flannel or other suitable flexible material, and cut into proper lengths by the aid of a "horse."

[Printed, 10*d*. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 193; and Engineers and Architects' Journal, vol. 9, p. 356.]

A.D. 1846, June 2.—N° 11,236.

PERCY, William Carter Stafford. — 1. Tempering or preparing clay or other plastic material by mixing with water to a thick creamy consistency, agitating in a pug mill or otherwise, passing through a sieve to separate stones or other hard substances, permitting the mass to stand until the clay subsides, and then drawing off the water, and drying the clay until ready for use. The drying may be accelerated by using the waste heat from brick clamps or kilns; and this waste heat may also be employed for drying bricks previous to burning.

2. Bricks with grooves or cavities in the sides to be used for the prevention of damp walls, for heating and ventilating, &c., &c.

3. New form of brick for building bridges, viaducts, tunnels, chimneys, towers, &c.

4. New form of brick to be used for coping or covering walls and parapets, the gable ends of buildings, &c.

5. Grooved brick for retaining all kinds of plain or ornamental plaster or cement.

6. Hollow rectangular drain tile, formed with a grating at the top, for the purpose of permitting the water to drain through in wet weather, and to evaporate and moisten the soil in warm weather. The patentee claims the above forms of bricks and tiles, whether made of clay or other plastic material or composition, or of wood, stone, or any other material.

7. Machine for pressing bricks or tiles in a deep mould between two pistons, the upper affixed to a sliding frame, and the lower piston acted on by springs.

8. Peculiar construction of chimney top to prevent down draught.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 264.]

A.D. 1846, July 6.—N° 11,282.

RANSOME, Frederick, and WARREN, John Crabb, Blair.—1. Preparing clay or plastic materials for forming bricks, tiles, pipes, and similar articles, by the admixture therewith of vegetable, mineral, or bituminous substances (as saw dust, spent tanners' bark, shavings, wood chips, charcoal, chopped straw, small coal, asphalte, pitch, &c.), which, being destructible, or partially destructible, by fire, may be burnt out of the bricks, tiles, pipes, or other articles, when they are submitted to the ordinary process of burning, leaving such articles exceedingly porous, and particularly applicable to subsoil draining.

2. Relates to brick and tile machines having two horizontal fixed cylinders, furnished with dies or moulding orifices at the outer end, and with doors at the upper part for the admission of clay, which is forced through the dies of each cylinder alternately by the action of two pistons affixed to opposite ends of one plate or bars The improvement consists in the application to these machines of such gearing as will, by the continuous rotation of a pinion in one direction, cause the pistons to move alternately in opposite directions. A mode of filling the cylinders is also described.

[Printed, 6*d*. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 171; and Engineers and Architects' Journal, vol. 10, p. 145.]

A.D. 1846, September 17.—N° 11,374.

FRANKLIN, Henry.—Manufacturing bricks, tiles, pipes, &c., by means of apparatus so arranged that the processes of pugging, screening, and moulding the clay may be performed in one machine. The clay is introduced into an upright cylinder, containing a double-threaded screw, which forces it downwards through screens, and then a continuation of the screw presses the screened clay into a rectangular chamber below, and thence through mould or die plates. The moulded clay is received by endless webs, which carry it beneath suitable cutting apparatus.

[Printed, 9*d*. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 240; Mechanics' Magazine, vol. 46, p. 459; and Patent Journal, vol. 2, p. 732.]

A.D. 1847, May 10.—Nº 11,700.

MARTIN, JOHN.—1. Mode of constructing water and sewerage or drain pipes and couplings, so that they may be readily connected or separated. The pipes may be of cast-iron or clay, according to the purpose to which they are to be applied. They are cylindrical, and have simply a bead formed thereon to determine the position of the coupling. Each coupling consists of two semicircular bands, suitable for embracing the adjoining ends of the pipes, and formed with dovetail projections to receive corresponding clips, whereby the coupling is secured. One half of the coupling may be formed in one piece with the end of each pipe.

2. Valves or traps for closing the ends of pipes used in draining and the outlets of sewers.

3. Drain traps for house drains and street gullies.

4. Machine for cutting drains in land and depositing sand therein.

5. Making perforated drain pipes with the perforations inclining to each other, and converging to a point above the top of the tube. "By this arrangement, although the tubes be covered with fine "sand, yet the water will filter downwards, and rise up through "the perforations without carrying any of the sand into the pipes "or tubes."

[Printed, 10*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 11; and Patent Journal, vol. 3, p. 306.]

A.D. 1847, November 18.—Nº 11,972.

MARTIN, THOMAS.—Machine for manufacturing drain tiles, tubes and other articles from clay or other plastic material, having two boxes or chambers fixed side by side, and alternately supplied with clay; from which boxes the clay is alternately expelled through suitable dies at the front of the same, by means of two plungers working horizontally; and the moulded clay, on leaving the dies, is received by a series of rollers, and cut into suitable lengths by a cutting apparatus. The improvement in this machine consists in a mode of combining mechanical parts for giving motion to the plungers. This invention also consists in a method of constructing dies for making pipes with sockets, so that when a sufficient length of pipe has been made the moulding orifice can be enlarged, and a socket or enlarged portion of pipe made of any desired length.

[Printed, 1s. 9d. See Repertory of Arts, vol. 12 (*enlarged series*), p. 35; and Patent Journal, vol. 5, p. 85.]

A.D. 1848, March 8.—N° 12,079.

WHISHAW, Francis.—The object of this invention is to provide pipes, channels, or ducts, of any convenient form, suitable for receiving the wires of electric telegraphs, and for other uses requiring a number of separate pipes or channels, or in which pipes of earthenware or pottery of great uniformity of structure, and certain combinations of pipes of those materials and of glass, may be employed with advantage.

It consists,—1. In the formation of any required number of pipes, channels, or ducts, in the same mass of earthenware or pottery. The apparatus used consists of an open cylinder, mounted on a horizontal axis, and fitted with a piston, by which the mixed clay or material is forced through a dod or die at the bottom of the cylinder.

2. In the manufacture of clusters of pipes or single pipes by means of a conical dod or die, so as to obtain greater uniformity of surface and consistency of material than could be obtained by the use of the ordinary dods or dies.

3. In certain combinations and arrangements of pipes of earthenware, pottery, and glass.

4. In a mode of combining pipes of earthenware, pottery, and glass, so as to render them air-tight at the junctions.

[Printed, 10d. See Repertory of Arts, vol. 12 (*enlarged series*), p. 312; London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 181; Artizan, vol. 7, p. 15; and Patent Journal, vol. 6, p. 15.]

A.D. 1848, April 10.—N° 12,115.

SPENCER, Thomas.—1. Apparatus for employing the direct action of steam pressure upon clay or other plastic materials for manufacturing pipes or tubes or other hollow earthenware, and vessels or tubes of other plastic materials. An upright steam cylinder (furnished with a suitable slide valve) is fixed on a frame above the cylinder which receives the clay, and its piston-rod extends downwards through a stuffing-box, and carries another piston, by the descent whereof the clay is forced through a dod or die at the bottom of the clay cylinder.

2. Forming the above-named articles with socket or flange ends by means of dies of peculiar construction; also, method of forming any description of goods, in the manufacture of which the inside of the lower die is withdrawn or the dies are separated.

3. Apparatus for turning over the pipe or vessels, when of large dimensions, after the first part of the process of manufacture; also, the use of a drum or mandril for giving internal support to pipes (whether with or without sockets) whilst being expressed from the cylinder, in combination with a sliding ring, when the pipe is made with a socket.

4. Method of forming or turning curves or bends in such pipes.

5. Method of making "stilts and feet," and burning the pipes thereon.

6. Kiln for burning pipes and other hollow earthenware.

"A further improvement consists in the grinding of earthenware "pipes, also turning and boring them;" but no explanation is given of this improvement, nor is any claim made thereto.

To this Specification there is a Disclaimer and Memorandum of Alteration, filed in the Great Seal Patent Office, 26th March, 1851.

[Printed, 1*s*. 1*d*. See Repertory of Arts. vol. 12 (*enlarged series*), p. 378; Londou Journal (*Newton's*), vol. 35 (*conjoined series*), p. 145; Artizan, vol. 7, p. 57; and Patent Journal, vol. 6, p. 31.]

A.D. 1849, February 8.—N° 12,465.

TOOTH, WILLIAM.—1. Improvements in water-closets.

2. Improvements in chimney-pieces.

3. Machinery to be used in the preparation of clays and other materials, for the purpose of separating the finer from the coarser particles by straining through a sieve,—such finer particles being caused to pass through the openings or meshes of the sieve by atmospheric pressure.

4. Making pipes and gutters by forcing the clay by a plunger or piston through dod or force plates which have no bridges.

[Printed, 2*s*. 4*d*. See Mechanics' Magazine, vol. 51, p. 141; and Patent *Journal*, vol. 7, p. 216.]

A.D. 1849, February 28.—N° 12,495.

JACOB, CHARLES.—This invention consists simply in a mode of arranging apparatus for making sockets on earthenware tubes or pipes, whereby a socket is produced on a partially-formed tube or pipe by the application of a socket mould. It is shown applied to a machine, such as has been heretofore used for manufacturing earthenware tubes without sockets, and consisting of a pug mill or cylinder, containing a vertical axis, furnished with inclined blades, by the action whereof the clay or other plastic matter is forced through a moulding orifice at the bottom of the cylinder.

[Printed, 2*s.* 4*d.* See Repertory of Arts, vol. 14 (*enlarged series*), p. 216; Mechanics' Magazine, vol. 51, p. 212, and Patent Journal, vol. 7, p. 226.]

A.D. 1849, May 3.—N° 12,601.

WHALEY, THOMAS, and LIGHTOLLER, RICHARD ASHTON.—Improvements in machinery for manufacturing all kinds of bricks, tiles, quarries, pipes, and similar articles,—consisting principally in combining a pug-mill, pressing cylinder, screws, and die-plate in one machine. The clay passes through an opening at the bottom of the pug-mill, into a horizontal pressing cylinder below, containing a piston, which alternately advances to and recedes from the delivery end of the cylinder. As the piston advances, it gradually closes the opening, and forces the clay through screens into an inclined trough or mouth-piece, and thence through moulding orifices in a die-plate; the moulded clay, as it leaves the die-plate, being received by a train of small carriages. When the piston has completed its stroke, it begins to recede; and the bars of clay may then be severed between the carriages by means of wires. A mode of cleaning the screens is described.

[Printed, 1*s.* 1*d.* See London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 163; Mechanics' Magazine, vol. 51, p. 449; and Patent Journal, vol. 8, p. 82.]

A.D. 1849, June 7.—N° 12,645.

BURTON, BENNETT ALFRED. — Relates to the manufacture of pipes, tiles, bricks, copings, and similar articles. Consists principally in compressing or consolidating the particles of matter composing such articles. This is effected by taking the article, a cylindrical pipe for example, as it emerges from the moulding orifice, and passing it through a set of four rollers, having their peripheries turned to such a shape that when placed together they will form a circular hole, somewhat smaller in diameter than the pipe which is to be compressed. The compressing rollers and appendages may form a distinct machine, or they may be combined with the apparatus used for making the pipes, which consists of two upright cylinders for receiving the clay, cast together upon a sole plate, which turns on a stud, so as to bring each cylinder in succession beneath a piston, whereby the clay is forced through a die at the bottom of the cylinder, and on to a long hollow mandril extending to the compressing rollers. The number of rollers and the shape of their peripheries will vary according to the form of the article to be compressed.

Also making bends for pipes or bend pipes. Likewise machinery for forming rabbet or socket and screw joints on the ends of pipes, and cutting rabbet joints upon the ends of hollow bricks or tiles.

[Printed, 1*s*. 9*d*. See Mechanics' Magazine, vol. 51, p. 572; Practical Mechanics' Journal, vol. 2, p. 250; and Patent Journal, vol. 8, p. 153.]

A.D. 1849, June 27.—N° 12,677.

WILSON, William.—This invention consists in so arranging apparatus for cutting plastic tubes or tiles that their ends may be cut one out of the other, one having a concave or hollow end or cut, and the other a corresponding end or cut suitable for entering into the same.

[Printed, 1*s*. 4*d*. See Repertory of Arts, vol. 15 (*enlarged series*), p. 70; Mechanics' Magazine, vol. 51, p. 616; and Patent Journal, vol. 8, p. 153.]

A.D. 1850, March 7.—N° 12,989.

FOWLER, John.—1. Improvements in ploughs and machinery for draining land, and for introducing pipes or suitable materials for the purpose of drainage into the hollows produced by such ploughs. The apparatus consists of a carriage, supporting an upright coulter, which extends downwards into the earth, and carries at its lower end a shoe or share (similar to a mole plough), whereby a small channel or trench is formed at any required distance below the surface, and as the pipes are strung like bugles or beads upon a rope connected to the shoe, they are drawn into the channel or trench as the shoe advances.

2. Using wooden pipes for draining land; machinery for manufacturing the same; sawing longitudinal openings or slits in the sides of the wooden pipes for the admission of water.

3. As a substitute for drain pipes, twisting heather into the form of a rope, and drawing such heather rope into the trench formed by the shoe or share.

[Printed, 3*s*. 2*d*. See Mechanics' Magazine, vol. 53, p. 218; and Patent Journal, vol. 9, p. 271.]

A.D. 1850, April 27.—N° 13,064.

ELLIOTT, William Gilbert, (*a communication*). — Manufacturing bricks, tiles, pipes, and other articles from clay or other plastic material, by melting such clay or other plastic material in a suitable furnace, and running the same, when fluid, semi-fluid, or in a state of fusion, into moulds or casts of the articles to be produced.

[Printed, 3*d*. See London Journal, (*Newton's*), vol. 36 (*conjoined series*), p. 317; Mechanics' Magazine, vol. 53, p. 299, and vol. 57, p. 443; Artisan, vol. 9, p. 114; and Patent Journal, vol. 9, p. 114.]

A.D. 1850, October 17.—N° 13,285.

FOWLER, John.—1. Novel arrangements of the slide valves of steam engines, also applicable to engines and pumps used for raising and forcing fluids.

2. Improvements in apparatus for drawing pipes or tubes into land, for the purpose of irrigating or draining the same, or for conveying and depositing liquid manure.

3. Machinery for cutting and boring wood for making drain pipes, and for other uses.

[Printed, 4*s*. 11*d*. See Mechanics' Magazine, vol. 54, p. 337.]

A.D. 1850, November 30.—N° 13,376.

AINSLIE, John.—1. Employing two or more series of circular plates or discs, fixed on spindles or shafts, with the discs of one series entering the spaces between the discs of the next series, and revolving in the opposite direction, for crushing and grinding earths, clays, or other materials used in the manufacture of bricks, tiles, pottery-ware, and china, or any article made of plastic material, and also for grinding mineral, animal, or vegetable matters.

2. Arrangements of kilns for drying and burning bricks, tiles, &c., or for drying or burning mineral, animal, and vegetable matters.

3. Employing two or more series of circular plates or discs, fixed on spindles or shafts, and working one within the other in opposite directions, for forcing clay or other plastic material into or through a mould or moulds.

[Printed, 7*d.* See Mechanics' Magazine, vol. 54, p. 458; and Patent Journal, vol. 11, p. 133.]

A.D. 1851, June 3.—N° 13,653.

ADAMS, WILLIAM BRIDGES.—This invention includes numerous improvements in railways and other roads and ways, buildings, bridges, locomotive engines, railway carriages and waggons, &c. The parts of the invention which relate to draining consist in the use of hollow perforated girders or rails as drain pipes; constructing roads and ways with two surfaces one above the other, the upper or wearing surface perforated for water, dust, or mud to pass through, and the lower surface impervious, or otherwise, as may be preferred, with an open space between the two surfaces; also, constructing roads and ways in such manner as to make them more solid and firm, and at the same time to drain them better, by using flagstones, slates, or sheets of iron, laid on concrete, to form an under surface, on which perforated iron gratings are to be laid, or, if preferred, wood, stone, asphalte, or bitumen.

[Printed, 3*s.* 2*d.* See Mechanics' Magazine, vol. 55, p. 476; Practical Mechanics' Journal, vol. 4, p. 226, and vol. 5, p. 65; and Patent Journal, vol. 12, p. 133.]

A.D. 1851, July 22.—N° 13,698.

DUNDONALD, THOMAS, Earl of.—Using the bitumen, petroleum, or natural pitch of Trinidad, and of the British North American Colonies, in the construction and manufacture of sewers, drains, water-ways, pipes, reservoirs, and receptacles for liquids or solids, and for making columns, pillars, capitals, pedestals, bases, and other useful and ornamental objects.

[Printed, 10*d.* See Repertory of Arts, vol. 19 (*enlarged series*), p. 289; London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 186; and Mechanics' Magazine, vol. 56, p. 98.

A.D. 1851, October, 9.—N° 13,769.

OATES, JOSEPH PIMLOTT. — Machine for manufacturing bricks, tiles, quarries, drain pipes, &c. It consists of a hopper or pug mill, the upper part whereof has the figure of an inverted cone. The middle portion is cylindrical, and the lower part (termed the "rectum") is conical or funnel shaped, terminating in a rectangular figure, corresponding in form and size to the length and breadth of the brick to be produced. The vertical shaft of the mill is furnished with inclined knives on the upper part, and with a continuous blade or screw below, fitting the cylindrical part of the hopper. Immediately under the rectum there is a frame which contains two moulds, open at top and bottom, and slides between two metal plates or plane surfaces. The clay, after being tempered by the knives, is forced by the screw from the rectum into the mould beneath, and then, by the movement of the frame, the filled mould is carried beneath a piston, and the empty mould is brought under the hopper. The sliding of the frame between the plain surfaces smooths the upper and lower faces of the brick; and while the empty mould is being filled, the piston descends, and forces the brick from the mould on to an endless web. For making tiles and other articles, the rectum, sliding frame, and pistons are removed, and another rectum and dies of suitable shape are substituted.

[Printed, 9*d.* See Mechanics' Magazine, vol. 56, p. 316.]

A.D. 1851, October 23.—N° 13,788.

ADCOCK, Henry. — Making pipes, chimney pots, bricks, tiles, copings, columns, &c., by "melting the mineral, rock, or " stoney substance known commonly as basaltes, trap, rowley rag, " or whinstone, or minerals of such like structure, and belonging to " the same geological genus, and running the same in a fluid state " into moulds suitably formed for producing castings of the shapes " and forms desired."

[Printed, 3*d.* See Repertory of Arts, vol. 21 (*enlarged series*), p. 45; London Journal, (*Newton's*), vol. 41 (*conjoined series*), p. 196; and Mechanics' Magazine, vol. 56, p. 375.]

A.D. 1851, December 8.—N° 13,850.

PIDDING, William. — Manufacturing bricks, slabs, blocks, tiles, pipes, &c., from combinations of broken stone, scoria, muriate or acetate of alumina, mineral earths, fluxes, wood or sawdust, coal, coke, papier maché, naphtha, vegetable fibres, pitch, glue, gutta percha, &c.

Veneering blocks, slabs, bricks, &c., with slate, stone, marble, or other suitable substance.

Coating ordinary bricks with pipe-clay, porcelain-clay, or any other clay of a superior nature.

Coating or facing bricks, tiles, slabs, &c., with cement.

Making bricks of sulphate of alumina.

Rendering bricks and other building materials more durable, firmer, and better fitted for sewers, canal-beds, and other places where complete imperviousness to moisture is required.

Applying a plain or colored glaze to building materials.

New cements for building purposes.

Making bricks, slabs, tiles, pipes, pillars, steps, mantel-pieces, and other articles, by burning coal to coke in a mould, and adding cements or varnishes. Also mixing coke, charcoal, cinders, or anthracite with coal or any carbonaceous material. Likewise adding, when desirable, vegetable fibres, pitch, sawdust, &c.

Combining any of the above-named materials with gutta percha or marine glue for building purposes, breakwaters, and ships.

[Printed, 4*d*. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 110; and Mechanics' Magazine, vol. 56, p. 499.]

A.D. 1851, December 19.—N° 13,864.

CLAYTON, Henry.—Relates to the manufacture of tubes, pipes, tiles, and other articles from plastic materials.

1. Improved dies or moulds for forming large pipes and other articles, the cores whereof are supported in such manner as to leave a clear space for the material over and through the moulding orifice.

2. Producing socket and other joints on pipes and other articles by forming such articles with an enlargement and extra thickness of material at the end or sides, and, when requisite (and previously to burning), removing a portion of the material from the enlarged or thickened end, side, or sides.

3. Tools or apparatus for cutting "square rebated," grooved, tongued, bevelled, chamfered, or other form of jointings on pipes, tiles, and other articles.

4. Apparatus for receiving and supporting pipes in the course of formation.

[Printed, 10*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 91; Mechanics' Magazine, vol. 56, p. 515; and Artizan, vol. 10, p. 254.]

A.D. 1852, April 6.—N° 14,054.

OATES, Joseph Pimlott.—The invention forming the subject of these Letters Patent is the same as N° 13,769. By the former Letters Patent the invention was protected in England, Wales, and the town of Berwick-upon-Tweed; and these Letters Patent were granted to extend the protection to the Colonies.

[Printed, 9*d*. See Mechanics' Magazine, vol. 57, p. 319.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 1.—N° 138.

PEACOCK, RICHARD ATKINSON.—Making oval drains of several pieces, moulded or formed at their edges with grooves and projections, so as to fit together and produce the oval form required. The parts may be put together in such manner as to break joint longitudinally.

[Printed, 2½*d.*]

A.D. 1852, October 5.—N° 238.

ELLIOTT, WILLIAM GILBERT.—Manufacturing bricks, pipes, tiles, and other articles capable of being moulded, from the slag of the smelting or blast furnaces of iron works, or from a fluid mass of the nature of such slag, by running the same into moulds, and pressing, stamping, or rolling, and gradually cooling or annealing the moulded masses.

[Printed, 3½*d.*]

A.D. 1852, November 5.—N° 656.

DUNDONALD, Admiral the Earl of.—Treating bituminous substances and applying the same to various purposes, including the manufacture of pipes for the distribution of liquid manure, and the joining together of pipes, especially those made of earthenware.

[Printed, 3½*d.*]

A.D. 1852, November 9.—N° 684.

DUNN, THOMAS, and WATTS, WILLIAM.—1. Constructing railway sleepers with holes, or with pipes, through which the wet and moisture from the surrounding ballast is carried off.

2. Constructing cast-iron sleepers of certain improved forms, so that the contraction of the metal will be equally distributed, and the sleeper, when laid on the ballast, will be less rigid than the cast metal sleepers generally used.

[Printed, 6½*d.*]

A.D. 1852, November 17.—N° 771.

WAY, John Thomas, and PAINE, John Manwaring.—Relates to the manufacture of burned and fired ware, comprising bricks, tiles, pipes, artificial stone, pottery, porcelain, &c. Consists in employing in such manufacture a stone or clay (found in Surrey, and which will probably be found in other parts), composed largely of soluble silica; and also in combining clay, lime, and other materials, with reference to the quantity of soluble silica present, (whether naturally or artificially obtained) in order to vary the character of the burned and fired ware produced.

[Printed, 3½*d.*]

A. D. 1852, November 27.—N° 898.

SCHOTTLANDER, William Edward, (*a communication from Emil Schott*).—1. Improved boring tools, carried by hollow rods or tubes, the rods and tools being impelled through the ground by apparatus arranged so as to give them a rotary motion around their axis at the same time that they are moved forward. The boring rods may be used as means of introducing clay and other pipes, for drainage and other purposes, into the aperture or channel made by the boring tools; or, in some instances, the hollow boring rods may remain in the bore to serve for the conveyance of gas or liquids.

2. Machinery for manufacturing clay pipes. The clay passes from the pug mill into a cleansing press, wherein it is forced by a piston through a sieve, which separates the stones, &c., therefrom; and the cleansed clay is conducted into the cylinder of a moulding press. The delivery end of this cylinder has a row of circular openings, with a long wooden rod extending through the centre of each, so as to form a series of ring-shaped apertures, through which the clay passes when acted upon by the piston of the press, and slides along the rods in the form of pipes. When the pipes reach the outer ends of the rods, they are cut into lengths and removed on the rods to dry.

3. Apparatus for surveying and levelling preparatory to boring earth.

[Printed, 2*s.* 1½*d.*]

A.D. 1852, December 4.—N° 961.

CLIFF, Joseph.—Improvements in making and compressing bricks, lumps, tiles, quarries, pipes, &c. Consist in the use of steam pressure in lieu of mechanical or hydraulic pressure in the making of bricks or other articles from disintegrated or pulverized clay, or from clay otherwise prepared; and also in compressing bricks, pipes, or other articles, by the use of steam pressure, whether made by the above or any other process. In the machine described for effecting the first part of the invention, a small steam cylinder communicates an intermittent rotary motion to a circular horizontal table, having four pairs of moulds or openings, each fitted with a plate capable of sliding up and down therein. Each movement of the table brings a pair of moulds beneath a hopper filled with clay; the next movement carries the filled moulds beneath a pair of pressing plates, actuated by another steam cylinder, whereby the clay is compressed into the form of a brick; the succeeding motion places the moulds over a discharging apparatus, which forces out the bricks; and the next movement brings the empty moulds beneath a projection on a descending arm, which forces the plates to the bottom of the moulds.

Bricks, lumps, tiles, quarries, terra cotta, and similar solid articles, are compressed in a machine similar to the above, but without the feed hopper. In the machine for compressing pipes, the pipe is put on a mandril or core, and placed in a horizontal semi-cylindrical die or mould; an upper semi-cylindrical mould is then forced down by steam pressure, whereby the pipe is compressed, and at the same time, by means of semicircular knives on the ends of the moulds, it is cut to the proper length; after this the core is turned round so as to polish the internal surface of the pipe.

[Printed, 1*s.* 2½*d.*]

1853.

A.D. 1853, January 13.—N° 94.

UREN, EDWARD WILLS.—Making bricks, pipes, tiles, imitation or artificial stone, and peat bricks for fuel, by means of a machine consisting of a pug mill, formed with a series of openings in the bottom, through which the clay or other plastic material is forced by a cone, carrying a set of screw blades, and fixed on the vertical shaft of the mill; then, by means of slides or pistons (one beneath each opening), the clay is pressed into chambers and through dies or moulds, and, on issuing from the dies, the moulded clay is divided into suitable lengths by self-acting cutters. Instead of using the slides or pistons, the clay may be pressed into the chambers by screws.

[Printed, 1*s.* 1½*d.*]

A.D. 1853, February 5.—Nº 320.

WHITEHOUSE, John, and WHITEHOUSE, John.—Manufacturing knobs for doors, basins, cups, pipes, handles, artists' color pans, &c., from powdered earthy materials, instead of using these materials in a plastic state. Employing dies with moveable parts, compound dies, and divided or segmental dies, in machinery wherein the compression of the earthy material is effected by the descent of a piston or plunger, or by forcing the dies or moulds upwards against a stationary block. Improvements in roses for door-lock knobs, and in preventing drawer and other like knobs from coming off furniture.

[Printed, 11½*d.*]

A.D. 1853, February 8.—Nº 335.

BELLFORD, Auguste Edouard Loradoux, (*a communication*).—Rolling bituminous and asphaltic matters, and applying the same to a great variety of purposes, including the manufacture of rain or water pipes, drain pipes, and gutters.

[Printed, 7½*d.*]

A.D. 1853, February 15.—Nº 396.

WHITTON, William Blissett, and WHITTON, George Samuel.—Relates to that class of pipes (particularly those of large diameter) made by forcing clay or plastic materials through moulding dies or orifices; and consists in making the dies or orifices with a number of small cores around the main core, whereby longitudinal openings will be produced in the sides of the pipes, in place of such sides being made solid as heretofore,—the object being to cause the pipes to dry and burn better than when made solid.

[Printed, 6½d.]

A.D. 1853, February 16.—Nº 403.

MACKAY, George Gray.—Manufacturing earthenware drain pipes in two distinct valves or segments, divided longitudinally along the centre, the junction edges being stepped or made so as to overlap each other slightly and form a firm secure joint. Segmental bricks may be used for a similar purpose, instead of half pipes, and the transverse sectional area may be of any required shape.

[Printed, 5½*d.*]

A.D. 1853, February 22.—Nº 450.

HUDSON, James, and HUDSON, Thomas Bamford.—Machinery for forming bricks, tiles, and drain pipes or tubes. Prepared clay is introduced into a hopper, whence it is conducted downwards by three screws to the compartments of a sliding frame, and compressed into the same by a plunger or plate; then, by the movement of the frame, the filled compartments are carried from beneath the hopper, and brought opposite a row of forcers, whereby the bricks are ejected from the compartments, and at the same time, such movement brings a corresponding number of empty compartments beneath the hopper.

When the machine is to be used for producing tiles, drain pipes or tubes, and perforated or hollow bricks, the sliding frame and parts acting therewith are removed, and a plate with suitable moulding orifices is placed opposite the plunger.

[Printed, 6½*d.*]

A.D. 1853, February 26.—Nº 488.

BLANCHARD, Mark Henry. — Producing drain or sewer pipes or tubes (made of earthenware, clay, or similar materials) of sufficient strength with a less quantity of material than is usually employed. This is effected by making the pipe of two thicknesses of material, *i. e.* of two pipes, one within the other, with an annular space between them,—the outer and inner pipes being connected together by narrow partitions, which run longitudinally along the annular space. The pipes are made without flanges, and are connected together by means of dowels, which enter the annular spaces at the ends of the pipes.

[Printed, 2½*d.*]

A.D. 1853, May 9.—Nº 1134.

BEAUMONT, Edward Blackett.—1. Mode of constructing the roofs of dwelling-houses and other buildings.

2. Rendering the longitudinal "hipped" joints of the roofs more secure against the admission of water.

3. Using clay-tile socket pipes for forming gutter spouts or fall pipes for conveying the water from the gutters of roofs.

[Printed, 7½*d.*]

A.D. 1853, May 11.—N° 1167.

WHITAKER, Edmund, and WALMSLEY, James.—Application of the direct action of the elastic force of air for the purpose of compressing clay into or through dies or moulds used in the manufacture of pipes, tiles, bricks, and slabs.

[Printed, 5½*d.*]

A.D. 1853, May 31.—N° 1335.

SHOEBRIDGE, William Frederick. — Making openings with suitable covers in earthenware and other drain pipes, which, being laid down in known localities, can be got at and the state of the interior of the drain ascertained with facility, and any impediments removed.

[Printed, 2½*d.*]

A.D. 1853, June 1.—N° 1347.

DUNDONALD, Admiral the Earl of.—Apparatus for laying drain or other pipes in the earth, consisting of a carriage or beam, having a coulter or cutter for vertically parting the earth, and a horizontal tool attached thereto, similar to that of a drain plough, whereby a channel is formed for the reception of the pipes, which descend through an inclined passage from the upper and foremost part of the carriage, and are continuously deposited in the channel, —the pipes being connected for this purpose by a rope, which is preferred to be elastic.

Forming one end of each pipe with a concentric knob, which fits into a cup or circular segment on the end of the next pipe, in the manner of a ball-and-socket joint.

[Printed, 4½*d.*]

A.D. 1853, June 4.—N° 1384.

WHITEHEAD, John.—Relates to the "collaring" or "socketing" of clay or earthenware pipes, and consists in the use of a stationary supporting frame, contrived to carry the socket or collar mould upon a graduated incline, in such manner that the mould may be raised or lowered at pleasure, to suit long or short pipes,—the plunger being worked by a lever in the usual way at a fixed height.

[Printed, 2½*d.*]

A.D. 1853, July 9.—N° 1642.

SPROT, Mark, and DENHOLM, Robert.—Relates to the manufacture of pipes and tubular articles from clay or plastic materials, wherein the sockets or end junction pieces of such articles are formed at the time of moulding or shaping the plain portion of the pipe or other article. To the delivering end of a pug mill is attached the mould for the socket of the pipe, and within it is placed a core bar, made to suit the intended shape of the pipe and socket. The clay is forced, by the action of the pugging apparatus, into the annular space between the end of the core bar and its surrounding socket, whence it issues through an annular space corresponding to the diameter of the main portion of the pipe at the outer end of the socket. When the required length of pipe has been formed, the machine is stopped; and the clay left in the socket mould, at the moment of stopping, becomes the completed socket for the pipe.

Instead of the pug mill arrangement, the direct pressure of a steam or water cylinder, or any known plan of forcing clay, may be used for pressing the clay into and through the mould.

[Printed, 2½*d.*]

A.D. 1853, July 12.—N° 1657.

SAMUELSON, Martin.—Application of hydrostatic power to work brick and tile moulding machines, such as are known as Beart's patent brick, tile, and pipe machines, as well as machines of various other kinds for moulding clay or plastic material. The clay descends from the receiver into a horizontal moulding chamber, having dies or moulding orifices at its two opposite ends, through which the clay is alternately expressed by the traversing movement of a piston. Hydrostatic power may be applied to actuate the piston by connecting it to a double plunger or ram, working at each end in a fixed hydrostatic cylinder; or to a hydrostatic cylinder, which traverses on a stationary piston; or to two rams or pistons, working in a duplex hydrostatic cylinder, and connected together by two bridle pieces; or to the rod of a piston which works in a stationary hydrostatic cylinder at the side of the machine. Steam, air, gas, or other fluid may be used as the motive agent for this machinery instead of water.

[Printed, 11½*d.*]

A.D. 1853, August 9.—N° 1854.

BRUCK, Louis Hartog.—Constructing tunnels, sewers, drains, pipes, tubes, channels, and other like conduits, for hydraulic or pneumatic purposes, of calcareous cements.

[Printed, 2½*d.*]

A.D. 1853, August 17.—N° 1921.

HERITAGE, John.—Application of a mould, die, or mouthpiece, containing water, in front of and in addition to the ordinary moulding orifice of machines or instruments used for the manufacture of bricks, pipes, tiles, coping, and such other articles as are or may be moulded in clay,—the additional mould, die, or mouthpiece being so applied that the stream of clay issuing from the ordinary moulding orifice, after being wetted with water, shall be smoothed by passing through the second mould or die.

[Printed, 6½*d.*]

A.D. 1853, August 17.—N° 1926.

GRIMSLEY, Thomas.—Machinery for manufacturing bricks, tiles, pipes, and pottery, consisting of a mill for grinding or pugging the clay and crushing any stones or foreign matter, combined with apparatus for moulding and pressing the clay. The top and bottom of the mill are composed of two fluted conical surfaces, free to revolve around a vertical central shaft, and including between them one or more fluted conical rollers, each free to revolve around its own axis only. Motion being given to either surface, or to one of the conical rollers, will cause all the rollers to revolve around their axes, and will impart rotary motion to the top and bottom surfaces in contrary directions. The top surface has apertures to admit the clay, and the under surface is also formed with apertures through which the clay is pressed by the conical rollers into a receiving chamber, and is thence forced by a revolving scraper through apertures in the bottom into mould boxes, where it is subjected to the pressure of a piston and then ejected on to a travelling bed.

If great pressure is not required, the moulds or dies may be placed under the apertures in the receiving chamber; and then by the action of the scraper or coulter the clay will be forced into the moulds or through the dies.

The upper fluted surface may be dispensed with, in which case the lower one is made a fixture, and the conical fluted rollers are mounted on axes projecting from a central main shaft and revolving with it, so as to press the clay through perforations made between the flutes of the under surface.

[Printed, 1*s.* 0½*d.*]

A.D. 1853, August 24.—N° 1970.

HILL, Thomas, and THOMSON, Alexander.—Improvements in the manufacture of pipes or hollow articles from plastic materials. The clay is fed into a pug mill or other moulding and supplying apparatus, and forced through a moulding die at the bottom of the clay chamber. The core piece for shaping the interior of the pipe is suspended from the lower end of the main shaft or spindle, or from the lower extremity of a spindle contained within the main shaft. When sockets are to be moulded upon the pipes, the interior of the lower extremity of the die is made to correspond in shape with the exterior of the required socket, and the interior of the socket is to be shaped by a solid core, adjustable from below. As the clay begins to emerge from the working cylinder, it first passes through the plain part of the die, and thence into the wider portion fitted with the socket core piece. As soon as the socket is actually shaped, the bottom core is let down, and, the moulding still proceeding, the plain part of the pipe is moulded, pushing before it the primarily moulded socket.

Instead of the core piece being supported as above described, it may be carried by a spindle standing up from the ground.

[Printed, 11½*d.*]

A.D. 1853, September 27.—N° 2215.

CALLAN, Nicholas.—Protecting iron against the action of the weather, or of rain, river, spring, and sea water, by coating it with an alloy of lead and tin, so that iron thus protected may be used for roofing, for cisterns, pipes, gutters, window frames, telegraphic wires, and for marine and other purposes.

[Printed, 2½*d.*]

A.D. 1853, October 12.—N° 2340.

CALLAN, NICHOLAS.—Coating iron with an alloy of lead and tin, or with an alloy of lead, tin, antimony, and zinc, or with an alloy of tin with one or more of the other three metals, in order to protect the iron against the action of the weather and of various corroding substances; and using iron thus protected for roofing, for making cisterns, baths, gutters, pipes, window frames, telegraphic wires, and for marine and other purposes.

[Printed, 2½*d.*]

A.D. 1853, October 12.—N° 2342.

SMITH, THOMAS.—The object of this invention is to submit newly-formed pipes of clay to a regular and considerable pressure in suitable apparatus, whereby the material is consolidated and air and superfluous moisture driven out, and the socket is formed without the addition of more clay or use of water. The clay pipe is made in the usual manner, and allowed to stand until stiff enough to be finished. It is then placed in a cylindrical case or jacket, and a core or plunger, worked by a powerful screw or hydraulic press, is driven down perpendicularly and concentrically into the cylinder or jacket, whereby the pipe is subjected to great pressure and the superfluous material is forced into the space between an enlarged portion of the core at the top and an enlarged part of the jacket, so as to form the socket.

[Printed, 4½*d.*]

A.D. 1853, November 8.—N° 2591.

CHAMBERLAIN, HUMPHREY.—Relates to those classes of machinery for making bricks and tubes or tiles, in which clay or brick earth is expressed through the orifices of a pug mill or other expressing machinery. In making bricks according to this invention, the clay is continuously expressed through a die or opening, somewhat larger than the required brick, on to an endless cloth; it then passes between four rollers covered with porous fabric, by which the form of the brick is obtained with great exactness; and the moulded brick earth is carried on by endless cloths to the cutting apparatus.

In making tubes, tiles, or hollow bricks, two or more grooved rollers are placed in front of the opening of a pug mill or other expressing machine, so as to form the mouth-piece or die; and cores or mandrils are fixed to enter between the grooved rollers. As the plastic clay is expressed, it puts the rollers in motion; and the moulded tube, tile, or brick is received by an endless cloth, and carried to the cutting apparatus.

[Printed, 10½*d.*]

A.D. 1853, November 19.—Nº 2691.

AUSTIN, William.—Forming the exterior surfaces of tubes or tiles made of brick earth, or clay, or plastic material, or glass, in such manner that they will pack together without loss of space between them, and thus facilitating stowage and carriage, as well as in some cases the use of such tubes or tiles. For this purpose the dies through which the clay or plastic material is forced are each made with six equal sides, so as to produce six-sided tubes. The tubes or tiles may be made in two or more parts, each composed of equal sides or parts of equal sides, so that when brought together they will form tubes or tiles having exteriorly six equal sides.

[Printed, 5½*d.*]

1854.

A.D. 1854, March 15.—Nº 619.

OATES, Joseph Pimlott.—Relates principally to such machines for making bricks, tiles, pipes, &c., as have moveable boxes or dies, open at top and bottom, and in which bricks or other articles are made by forcing a column of clay into the same; but part is applicable to other machines. Consists chiefly in preparing and forcing a continuous stream or column of clay into moulds or dies, open at top and bottom, and providing for the ready escape of the surplus clay during the filling of the moulds or dies. The clay is introduced into a vessel or mill furnished with an upright shaft, carrying screws at its upper and lower ends, and provided with pug knives in the intermediate space. By the lower screw the clay is forced into a chamber below, in which it assumes a sectional figure resembling that of the mould, and thence through the mould into a channel, termed an "expanding and contracting rectum," the contracted bottom whereof preserves the clay under pressure. As the filled mould slides away, the empty one moves under the chamber. The bottom face of the brick is planed or smoothed, as it passes from under the chamber, by the edges of slots in the plate on which it slides. The filled mould stops beneath a plunger, which descends and forces the brick from the mould on to an endless web.

[Printed, 7*d.*]

A.D. 1854, May 6.—N° 1015.

JENNINGS, JOSIAH GEORGE.—Improvements in the manufacture of earthenware pipes for drains and sewers, in order to facilitate the operation of laying the pipes, and to render drains and sewers easily accessible for the purpose of cleansing, repairing, &c. Consist in constructing what may be called junction or coupling pipes, which are each made in two parts or halves, with sockets at the ends to receive the ends of plain pipes; and such junction or coupling pipes are, when requisite, made suitable for receiving branch pipes and bends. Also, making pipes for drains and sewers with screw or spiral ribs exteriorly (to increase the strength thereof), by causing the clay or plastic earth to be forced through revolving dies.

[Printed, 6*d.*]

A.D. 1854, May 12.—N° 1057.

WAITE, WILLIAM.—Formation of blocks or pieces for the construction of sewers, drains, or pipes from irregular fragments of stone, or from gravel, sand, or other suitable materials, conjointly or separately, caused to adhere and made into a compact mass by means of bituminous cement, and lined or inlaid with glass, earthenware, zinc, or other suitable metal or material. The blocks or pieces may be cast in moulds in the form of lengths of pipe, or segments of a circle, or other suitable shape.

Strengthening pipes so constructed, or pipes made of any other material or materials, by means of longitudinal sleepers or strips of wood, laid under and cemented to the same.

[Printed, 8*d.*]

A.D. 1854, May 26.—N° 1171.

LIVINGSTON, ALLAN.—Making earthenware pipes for drains and sewers with an aperture in each length of pipe, in such a manner as to afford access to the interior thereof on the removal of the cover belonging to such aperture.

[Printed, 5*d.*]

A.D. 1854, June 8.—N° 1269.

BLACKBURN, BEWICKE.—Forming pipes by binding and cementing small slates together in a cylindrical form, the pieces of slate being so disposed as to overlap and break joint with each other and thus form a kind of wicker or woven work, consisting of slates and iron cemented and concreted with asphalte or other suitable cement.

Hoop iron or iron wire is used for interweaving with and binding together the pieces of slate. Iron collars and sockets are employed for connecting the pipes and for attaching the branch pipes thereto.

[Printed, 1*s.* 3*d.*]

A.D. 1854, June 17.—N° 1318.

HINDE, GEORGE JAMES.—Enamelling drain pipes or tubes and other articles made of clay, or of mixtures composed principally of clay.

[Printed, 4*d.*]

A.D. 1854, June 20.—N° 1354.

BYERLEY, GEORGE HENRY.—Manufacturing hollow bricks, tiles, quarries, slabs, and tubes or pipes from clay or brick earth in a dry or partially dry state (reduced to powder, and mixed with sand, ashes, or other suitable substance), by means of pressure. The apparatus used consists of a metal tube or chamber, cast in such manner that the interior will give the desired form to the articles to be made; rods or bars are supported within it, to form the hollows in the goods; and to the inlet end of the chamber is fitted a piston, made with openings through which the rods or bars extend. The clay is introduced into a hopper, and falls therefrom, when the piston is drawn back, between the end of the piston and the inlet of the chamber; by the return stroke of the piston the charge is forced into the chamber; and thus the clay is driven through the chamber by the successive strokes of the piston, and leaves the outlet in a solid and compact state, only requiring to be cut into lengths. If preferred, instead of a single chamber, a number of chambers may be arranged in a circle. The rods or bars and the openings in the piston may be dispensed with, and the goods made solid.

[Printed, 3*d.*]

A.D. 1854, July 21.—N° 1604.

KNIGHT, JOHN, and STUBBS, JAMES.—Improvements in the manufacture of bricks, tiles, pipes, &c.; applicable also to the manufacture of fuel, and to other mixing and tempering processes.

1. Introducing steam or water (either hot or cold) into the cylinders or piston boxes of brick machines and other machines for fashioning clay and other plastic materials.

2. Using a second die or mouth-piece in brick and other machines to act on the roughly-moulded stream of clay as it leaves the ordinary mouth-piece. Steam is introduced into the second die, for the purpose of warming and more readily moulding the clay; and this die may also be used for coating the clay with any coloring, glazing, or other material.

3. Impressing bricks, tiles, and quarries with devices or inscriptions by means of rollers.

4. Fixing cores or bars in the dies of brick-making machines,—the cores being so placed between the piston and the interior of the dies that the perforations made by the said cores are closed before the stream of clay leaves the machine.

5. Moulding artificial fuel into masses, having perforations therein; and using nitre or nitrate of soda in the composition of artificial fuel.

6. Employing a friction sheave for driving brick machines; and giving motion to the pistons of brick machines by means of a rocking shaft.

[Printed, 6*d.*]

A.D. 1854, August 10.—N° 1751.

UREN, EDWARD WILLS.—Machine for making bricks, pipes, tiles, and artificial stone from clay and other plastic materials. The clay is introduced between a pair of conical rollers into an upright cylinder, wherein it is acted on by pugging knives affixed to a central shaft; and, after being sufficiently pugged and tempered by the knives, it passes from the cylinder at the bottom between rollers, whereby it is pressed into moulds carried by rotating tables;—suitable scrapers being fixed to the central shaft, below the rollers, for the purpose of scraping the clay into the moulds. Other rollers and scrapers are also provided, to further press and consolidate the clay in the moulds on leaving the mill, and to scrape the superfluous clay from the top of the moulds. In each mould there is a small frame or brick carriage, which rises, as the mould is carried by the rotation of the table from beneath the mill, and forces the brick upwards out of the mould.

[Printed, 3*d.*]

A.D. 1854, August 21.—N° 1835.

SMITH, William Henry; BESSEMER, Henry; and LONGSDON, Robert.—Making drain pipes, columns, tiles, and numerous other articles of the vitrified substances or slags produced in the process of smelting iron and other metals.

[Printed, 3*s.* 2*d.*]

A.D. 1854, October 3.—N° 2126.

COOPER, Thomas.—1. Improvement in the manufacture of earthen pipes (such as drain pipes) by moulding them in two parts or halves, having alternate projections and depressions on their edges, which, when the two parts or halves are brought together, interlock and unite them, thus forming a complete pipe.

2. Mode of joining earthen pipes by forming short lengths of suitable dimensions in two parts or halves, with alternate projections and depressions on their edges, and putting two of these pieces together around the ends of two cylindrical pipes, with a suitable cement interposed.

[Printed, 5*d.*]

A.D. 1854, November 22.—N° 2468.

GIBSON, Charles.—Machinery for manufacturing bricks, tiles, and drain pipes. The moulds, which are open at top and bottom, are mounted either in a circular or rectangular frame (being arranged, by preference, in pairs), and caused to move alternately under a hopper to receive the clay, and under a descending piston or plunger, by which the moulded articles are discharged on to an endless band. The hopper is provided with rotating feed rollers for forcing down the clay into the moulds; and the moulds, whilst being filled, stand over a table. For making hollow bricks, tiles, and pipes, suitably-shaped cores are fixed in the moulds. If desirable, the moulded articles may be discharged by pistons acting below the moulds.

[Printed, 3*d.*]

A.D. 1854, December 23.—N° 2713.

WALKER, James.—Direct application of the elastic force of steam for dislodging plastic clay from the receiving chambers of pug mills employed in preparing and forcing clay into and through dies for the purpose of forming it into bricks, tiles, tubes, or other forms. Also employing the direct action of the elastic force of steam for the above purpose, acting alternately on both sides of a piston.

[Printed, *3d.*]

1855.

A.D. 1855, January 11.—N° 71.

NORTON, John.—Application and use of hard balls or spheres of clay in the formation of a permeable stratum or line of water-course for the purpose of carrying off the water from land. The clay is worked up and moulded by the aid of suitable machinery into spherical balls, which, when dried, are burned to a crystalline hardness. The size must be varied to suit circumstances, but a diameter of four or five inches is the average size preferred. Such balls, when laid in drain cuts in the soil, allow the surface water to descend and pass freely between them.

[Printed, *7d.*]

A.D. 1855, January 18th.—N° 137.

PIDDING, William.—Manufacturing building materials by cementing together pieces of coke, pumice-stone, stone, sand, porcelain, china-ware, earthenware, glass, shells, bones, and earthy and metallic matters, with silicious cement, in moulds under great pressure, drying in the open air, and subjecting to heat, not exceeding that of boiling water, in an oven.

Making pipes for water or gas by connecting pieces of slate together by means of bolts and screws; in some cases introducing cement, caoutchouc, or gutta percha between the divisions of the slate; and also bolting wood, skins, leather, glass, metal, or metal coated with glass, between the divisions of slate.

[Printed, *3d.*]

A.D. 1855, January 19.—N° 149.

HILL, THOMAS COËNDOZ.—Shaping the ends of drain pipes and tiles in such manner that when two or more pipes are laid together they will form a good secure joint, and at the same time admit of any pipe or pipes being readily removed, and one or more new pipes substituted. These advantages are said to be secured by forming or cutting off the ends of the pipe at an angle, by preference, of 45°, or at any other angle than a right angle. When two lengths of pipe so formed are laid together they produce a scarf joint.

[Printed, 6*d*.]

A.D. 1855, February 16.—N° 350.

PERCY, WILLIAM CARTER STAFFORD, and CRAVEN, WILLIAM.—Manufacture of bricks, tiles, pipes, &c. 1. Using steam in tempering clay or similar plastic material.

2. Combining the operations of pugging and screening or separating stones, roots, &c., from clay.

3. Propelling plastic materials by rollers through a chamber into mould boxes, which are alternately brought opposite the mouth of the chamber (to be filled) and taken away again by a reciprocating action; also compressing the material in the moulds and delivering the moulded materials by pistons, fitting in the bottom of the mould boxes.

4. Drying articles moulded from plastic materials by the action of a current of air, produced by mechanical means.

5. Relates to machines in which pistons are used for forcing clay through moulding or screening orifices; and consists in arranging the chamber or box (in which the clay is placed to be acted on by the piston) so that it will move horizontally on slides or guides; also, in combining two chambers or boxes, so that they will move on slides or guides.

6. Diminishing the frictional or adhesive force of clay or plastic material on the sides of boxes or chambers by lubricating or keeping the sides of such chambers wet.

7. Manufacturing hollow bricks, tiles, and similar hollow articles, by first moulding the material to nearly the external shape and dimensions of the article required, and, when partially dry, subjecting it to pressure by means of dies and moulds, in order to complete the article; also, pressing hollow moulded articles by

means of dies and moulds, to give additional shapes to them, such as forming collars or sockets on pipes, tiles, and other articles of like nature.

[Printed, 1*s.* 6*d.*]

A.D. 1855, March 9.—N° 533.

HILL, THOMAS.—Machinery to be applied between the pug mill and the moulds used for making bricks, drain pipes, tiles, &c. It consists of a frame, composed of two sides and a curved bottom plate, with bearings in the side plates for the axis of a wheel or drum. This drum has four equidistant slots, the two slots of each pair being exactly opposite each other; and through these slots work four plungers, each pair being connected inside the drum by right and left-handed screws, so that the distance they are to protrude may be regulated. One end of the frame receives clay from a pug mill or other suitable source, and, as the drum rotates, the plungers carry forward the clay and deliver it at the other side of the frame into a box, to which the moulds or dies are fitted.

[Printed, 3*d.*]

A.D. 1855, May 12.—N° 1069.

SANDERS, FREDERICK GEORGE.—In those machines for making bricks, pipes, and tiles, in which the clay is forced through a mould or die by a pair of screws fitted in a horizontal trough, considerable strain is thrown upon one end of the machine, tending to draw the parts asunder. The object of the invention is to obviate this serious defect, by equalizing the force exerted upon each end of the machine in the following manner:—In a suitable trough for receiving the clay the patentee places two pairs of screws, the separate pairs being situated at opposite ends of the trough, and the threads thereof inclining in opposite directions; so that when the screws are caused to rotate they will force the clay from each end towards the centre of the trough, whence it passes out laterally through moulds or dies, and is received by endless bands. Knives may be substituted for the screw threads, for the purpose of mixing and forcing the clay through the dies, or for performing the process of pugging.

[Printed, 8*d.*]

A.D. 1855, May 12.—N° 1076.

FONTAINEMOREAU, Peter Armand, le Comte de, (*a communication.*)—Machine for boring or perforating stone and like materials in order to make pipes for conducting air, gas, and water, or for drainage and other purposes. The pieces of stone to be bored are fixed in separate frames or cases, capable of sliding vertically in outer cases, to which rotary movement is communicated; and each piece of stone rests on a fixed steel drill or tool, whereby the boring is effected,—the weight of the stone resting on the drill assisting the boring operation.

[Printed, 5*d.*]

A.D. 1855, June 23.—N° 1443.

PEARCE, William.—Relates to machinery for manufacturing pipes, tiles, hollow bricks, and like articles. In the ordinary machines the core of the die or mould is held in its place by cross bars or rods, secured to the upper part of the mould, whereby the clay is divided in its descent; and, although it is united by the pressure it undergoes in passing through the mould, the goods or articles are generally defective. Now this invention consists in supporting the core by a central shaft, so as not to interfere with the passage of the clay through the mould.

[Printed, 7*d.*]

A.D. 1855, June 27.—N° 1470.

MARGUERITTE, Louis Joseph Frédéric.—Improvements in the manufacture of glass and crystal. The object of this invention is to manufacture silicates of potash and of soda directly with chlorides of potassium and of sodium, thus avoiding the use of carbonates of potash and of soda. The patentee claims " calcining " chlorides of sodium and of potassium with a silicate, the ele- " ments of which are capable of forming a volatile chloride, and by " using any sort of clay; not limiting, however, the application of " my process only to manufacturing glass and crystal, but also " applying it to fine and common crockery, draining pipes, &^{c}."

[Printed, 4*d.*]

A.D. 1855, July 2.—N° 1494.

TOOTH, William Henry.—Making a series of holes in bricks and sewer blocks, by means of a single core of various shapes in conjunction with a conical die.

Using flat knives arranged to produce the effect of a screw, by setting them in horizontal rows and parallel to each other on the pug mill or other shaft, so as to dispense with the plunger or piston mentioned in the Specification of former Letters Patent, N° 12,465, for making drain pipes.

Forming sewer blocks with rabbets or grooves and projections.

Making tiles of clay, glass, or other material, with grooves and ribs on the under side; and forming openings in clay tiles to receive squares of glass.

Improvement in the mode of preparing plastic materials described under the third head of former Specification, consisting in the application of a pump to exhaust the air beneath the sieve.

Improvements in making chimney-piece jambs of clay and glass; also applying an iron shoe or guard to the bottom of the same.

New method of building kilns.

Forming the backs and sides of stove grates of fine clay, glazed to reflect the heat, in conjunction with a vessel to hold the fire, resembling a goblet or other desirable shape.

Making waterclosets, as set forth in the former Specification, by forcing the clay into moulds with pressure instead of moulding them by hand, and using rubbers to grind the parts and make them air-tight.

[Printed, *7d.*]

A.D. 1855, July 11.—N° 1556.

WILLIAMS, William.—Making socket pipes of clay by causing a mould of the form of the interior of the socket to be pressed up against the button of the die plate when the piston begins to express the clay; so that the pipe, as it leaves the die plate, comes against this mould, and is expanded to the form of the interior of the socket, while at the same time the exterior form of the socket is produced by a projecting portion of the die plate.

Also, giving motion to the pistons of brick, pipe, and tile machines by means of a cam or excentric on the main axis, which acts on rollers or trucks on the back of the pistons.

[Printed, *6d.*]

A.D. 1855, July 17.—N° 1600.

PIDDING, William.—1. Manufacturing building materials by cementing together pieces of coke, pumice-stone, stone, porcelain, stoneware, glass, shells, bones, sand, and earthy or metallic matters with silicious cement, pressing in moulds, drying in the open air, and afterwards subjecting to a gradual heating process in an oven, —the heat not exceeding that of boiling water. The coke may be used alone or in combination with any or all of the other substances.

2. Relates to pipes to be used for carrying off rain water or for drainage or other purposes, made of lengths of slate, glass, metal, or other material. The improvement consists in luting, filling, or cementing the edges and ends of the several portions or pieces with caoutchouc, gutta percha, or a combination of both;—the ends of the pipes being connected in the same manner as wood or metal piping.

3. Manufacturing building materials by compressing in moulds, after they are coated with papier maché pulp, the following substances, either separately or combined, and cemented together (when desired) by any suitable cement:—Coke, peat (charred or otherwise), wood, charcoal, pumice-stone, cinders. When the materials have been compressed, they are baked in an oven or otherwise dried. Or peat, alone or in combination with the above-named materials, may be compressed in moulds and then carbonized.

[Printed, 3*d*.]

A.D. 1855, August 16.—N° 1863.

MONK, Samuel.—Improvements in bricks for drainage, sewerage, and other purposes. "My improvements in bricks consist in so "forming them that they shall lap or fit one in the other at the "sides or ends; and which fitting may consist of rabeting or "lapping one part on the other, or angle grooving, or by sunken "cavities and corresponding raised parts, so disposed on the brick "that they may tie in one with the other lengthway as well as side-"way. This form of brick would be particularly adapted for "sewerage purposes, as they could be put together in a self-sus-"taining arch, and finished by grouting or cementing on the "top."

[Printed, 3*d*.]

A.D. 1855, August 24.—N° 1920.

EFFERTZ, PETER.—Machinery for making bricks, tiles, pipes, and similar articles, consisting of two "square cylinders," placed side by side, and each furnished with a piston. On each cylinder is fitted a cover; between which cover and the top of the cylinder a space is left for the introduction of a mould; and over the cover is suspended a frame with knives or breakers therein. The clay or other plastic material, after passing through the breaking frame, is fed into the moulds at the top of the cylinders from buckets mounted upon an endless chain; and then, by the ascent of the pistons, the clay is compressed in the moulds, and caused to assume the desired shape.

[Printed, 3*d.*]

A.D. 1855, August 24.—N° 1921.

SCHLICKEYSEN, C.—1. Apparatus for manufacturing pipes, bricks, and tiles by means of a pug mill with a cylindrical case expanding upwards, the central shaft whereof is fitted with radial knives of such shape, and arranged helically around the shaft in such manner that the last quarter of one blade will cover the first quarter of the following one,—the object being to obtain a downward pressure equal to that exerted by a solid piston, in order to press the clay downwards. At the bottom of the case a cylindrical vessel is keyed on the shaft, so as to form a false bottom to the mill and receive the downward pressure of the clay. The action of this revolving vessel will be to force a portion of clay upwards, and effect its discharge at a lateral opening in the lower part of the case covered by the mould plate, while at the same time another portion is being brought opposite the opening by the action of the rotating knives. To disengage the clay from the upper part of the case, a scraper or knife, carried by the central shaft, projects upwards, and continually describes a vertical circular cut. The inside of the case is fitted with radial arms, between which the helically-arranged knives work when forcing down the clay.

2. Modification of the apparatus to be applied to the washing of earths.

[Printed, 7*d.*]

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Newark (Nottingham).
Newcastle-upon-Tyne.
Newport (Monmouth).
Northampton.
Nottingham.
Oxford.
Paisley.
Plymouth.
Preston.
Reading.
Rochdale.
Rotherham.
Salford (Peel Park).
Sheffield.
Shrewsbury.
Southampton.
Stirling.
Stockport.
Sunderland.
Wakefield.
Warrington.
Waterford.
Wednesbury.
Wexford.
Wigan.
Wolverhampton.
Wolverton (Railway Station).
Yarmouth (Great).
York.